

**VARIABLE ALIGNMENT ZIPPER FOR RECLOSABLE BAGS**

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**FIELD OF THE INVENTION**

The present invention relates to improvements in flexible continuous plastic zippers of the rib and groove type wherein the ribs and grooves are sized and shaped to interlock when pressed together and to be releasable when pulled apart so as to form a reclosable zipper. More specifically, the present invention relates to a variable alignment zipper used on a reclosable bag where the alignment of multiple ribs and grooves provides numerous configurations for closure while maintaining a balanced tactile feel to the user when the bag is opened or closed.

15 **DESCRIPTION OF THE PRIOR ART**

The present invention relates to improvements in the package making art and may be practiced in the manufacture of reclosable thermoplastic bags and packages of the kind that may be used for various consumer products. Such packages often include a form of peel-seal to render the pack moistured and/or airtight prior to an initial opening of the package. A zipper with interlocking profiles protects any remainder of the product therein after the initial opening.

The prior art for zippers with interlocking profiles is fairly well developed but nevertheless remains open to improvements, specifically those which contribute to an ease of use. In the prior art, the Ausnit patents (U.S. Patent Nos. 3,325,084 and 4,787,880) disclose multiple male profiles on both sides of the zipper halves. A limitation on the use of multiple male profiles is the opening and closing emphasis of the profiles. In an operation with two or more male profiles, the higher force needed to open or close the profiles could convey to the user that the zipper is being damaged. An improvement to existing zippers would be to achieve a more level tactile feel when the user is opening or closing the zipper. This balanced tactile feel is achievable by an alternative design of interlocking male and female profiles.

## SUMMARY OF THE INVENTION

Accordingly, the present invention relates to a variable alignment zipper having a rib and groove type interlocking means. The male interlocking profile of the zipper has a plurality of male ribs, each with a double-barbed end section. The male interlocking profile is interlockable with a female interlocking profile. The female interlocking profile has a plurality of male ribs which form grooves for engaging the male interlocking profile. The bordering ribs of the female interlocking profile are each shaped with a single-barbed end section facing inward toward a middle male rib formed with a double-barbed end section. By varying the engagement of the male and female interlocking profiles, the zipper can align in any one of four positions for closure. These various alignments would each provide a balanced tactile feel to the user during an opening or closing of the zipper.

## DESCRIPTION OF THE DRAWINGS

Further objects and advantages of the invention will become apparent from the following description and claims and from the accompanying drawings, wherein:

Figure 1 is a front view of the variable alignment zipper of the present invention attached to a reclosable bag;

Figure 2 is a cross-sectional view of the variable alignment zipper of the present invention in a first engagement and with the view taken from reference line 2-2 of Figure 1;

Figure 3 is a cross-sectional view of the variable alignment zipper of the present invention in a second engagement with the view taken from reference line 3-3 of Figure 1;

Figure 4 is a cross-sectional view of the variable alignment zipper of the present invention in a third engagement and with the view taken from reference line 4-4 of Figure 1;

Figure 5 is a cross-sectional view of the variable alignment zipper of the present invention in a fourth engagement and with the view taken from reference line 5-5 of Figure 1.

## DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings in detail wherein like numerals indicate like elements throughout the several views, a variable alignment zipper 10 attached to a reclosable bag 12 is shown in Figure 1. A male interlocking profile 16 and a female interlocking profile 20 are also shown as covering the length of the zipper 10.

In Figure 2, the male interlocking profile 16 is interlocked with the female interlocking profile 20 in a first engagement of the zipper. The male interlocking profile 16 is a resiliently flexible profile attached to a side 22 of a reclosable bag by a web portion 24. The male interlocking profile 16 includes three male ribs 26, 30, 32, with each of the male ribs having double-barbed end sections (illustrated as an end section 34 for the male rib 32). The bordering of the male ribs 26, 30, 32 creates grooves 35 and 36. The number and shape of the ribs can vary based on factors known to those skilled in the art.

The female interlocking profile 20 is a resiliently flexible profile opposite and facing the male interlocking profile 16. The female interlocking profile 20 is attached to a second side 37 of the reclosable bag by a web portion 38. The female interlocking profile includes three male ribs 44, 48 and 52. The male ribs 44 and 52 are each formed with a single-barbed end section (illustrated as an end section 56 for the male rib 44). The single-barbed end sections of the male ribs 44, 52 extend laterally to the third male rib 48. The male rib 48 has a double-barbed end section 60. The bordering of the male ribs 44 and 52 to the male rib 48 creates grooves 64 and 68. The number and shape of the ribs can vary based on factors known to those skilled in the art.

For interlocking the male interlocking profile 16 and the female interlocking profile 20 in the first engagement of the variable alignment zipper 10, the profiles are pressed together. In the first engagement, a first male rib of the male interlocking profile 16 secures to a first groove of the female interlocking profile 20. As shown, the male rib 26 sizably conforms to the groove 68 with the male rib 26 adequately secured by an integral double-barbed end section. With a single-barbed end section

on the male rib 52 of the female interlocking profile 20, the male rib 52 slides into the groove 35 with less resistance to and movement of the male rib 30 than if the male rib 52 had a double-barbed end section.

5 The male interlocking profile 16 and the female interlocking profile 20 are adapted to be separated by pulling them apart in directions 70 and/or 72 thereby breaking the interlocking relationship of the male rib 26 with the groove 68. Similar to the closing operation, the single-barbed male rib 52 would encounter less resistance from the male rib 30 as the profiles are being pulled apart than if the male rib 52 had a double-barbed end section. For the other three interlocking engagements described  
10 below, the male and female interlocking profiles are similarly pulled apart in order to separate the profiles from one another.

For interlocking the male interlocking profile 16 and the female interlocking profile 20 in a second engagement of the variable alignment zipper 10, the profiles are pressed together. In the second engagement, two male ribs of the male interlocking  
15 profile 16 secure to two grooves of the female interlocking profile 20. As shown in Figure 3, the male ribs 26 and 30 sizably conform to the grooves 64 and 68 respectively. Both male ribs 26 and 30 are adequately secured to the female interlocking profile 20 by an integral double-barbed end section for each male rib. With a single-barbed end section on the male rib 52 of the female interlocking profile  
20 20, the male rib 52 slides into the groove 36 with less resistance to and movement of the male rib 32 than if the male rib 52 had a double-barbed end section. Similar to the closing operation, the single-barbed male rib 52 would encounter less resistance from the male rib 32 as the profiles are being pulled apart than if the male rib 52 had a double-barbed end section.

25 For interlocking the male interlocking profile 6 and the female interlocking profile 20 in a third engagement of the variable alignment zipper 10, the profiles are pressed together. In the third engagement, two male ribs of the male interlocking profile 16 secure to two grooves of the female interlocking profile 20. As shown in Figure 4, the male ribs 30 and 32 sizably conform to the grooves 64 and 68  
30 respectively. Both the male ribs 30 and 32 are adequately secured to the female

interlocking profile 20 by an integral double-barbed end section for each male rib.

With a single-barbed end section on the male rib 44 of the female interlocking profile 20, the male rib 44 slides into the groove 35 with less resistance to and movement of the male rib 26 than if the male rib 44 had a double-barbed end section. Similar to the closing operation, the single-barbed male rib 44 would encounter less resistance from the male rib 26 as the profiles are being pulled apart than if the male rib 44 had a double-barbed end section.

For interlocking the male interlocking profile 16 and the female interlocking profile 20 in a fourth engagement of the variable alignment zipper 10, the profiles are pressed together. In the fourth engagement, a male rib of the male interlocking profile 16 secures to a groove of the female interlocking profile 20. As shown in Figure 5, the male rib 32 sizably conforms to the groove 64. The male rib 32 is adequately secured to the female interlocking profile 20 by an integral double-barbed end section. With a single-barbed end section on the male rib 44 of the female interlocking profile 20, the male rib 44 slides into the groove 36 with less resistance to and movement of the male rib 30 than if the male rib 44 had a double-barbed end section. Similar to the closing operation, the single-barbed male rib 44 would encounter less resistance from the male rib 30 as the profiles are being pulled apart than if the male rib 44 had a double-barbed end section.

Thus the several aforementioned objects and advantages are most effectively attained. Although preferred embodiments of the invention have been disclosed and described in detail herein, it should be understood that this invention is in no sense limited thereby and its scope is to be determined by that of the appended claims.